MEASURING ARTHRITIC HAND SKILL PERFORMANCE DURING HORTICULTURAL ACTIVITIES

by

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B.S., University of Minnesota, 1982

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Horticulture

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Appreciation is extended to all of the people who served as contacts or as subjects for the study.

THESIS FORMAT

This thesis is written in manuscript style for publication in the gerontology journal, Activities, Adaptation & Aging.

HORTICULTURAL TASK PERFORMANCE: AN EFFECTIVE METHOD OF EVALUATING ARTHRITIC HAND SKILL

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ABSTRACT

This study compared arthritic and nonarthritic elderly persons' hand skill performance using two objective methods of evaluation. Horticultural tasks (Hand Capacities Horticultural Test) and several occupational therapy tasks from the Physical Capacities Evaluation of Hand Skill (PCE) test were used. The results indicated that each horticultural task was highly correlated with a similar occupational therapy task and each can be effectively used for diagnosing disability and prescribing treatment in physical rehabilitation programs.

Mark J. Gallagher is a graduate student in Horticultural Therapy at Kansas State University, Manhattan, Kansas and has a BS degree in Therapeutic Recreation from the University of Minnesota, Minneapolis, Minnesota. This study was undertaken as partial requirements of the Master of Science Degree at Kansas State University, Manhattan, Kansas. Dr. Richard H. Mattson is Professor of Horticultural Therapy at Kansas State University, Manhattan, Kansas 66506.

The PCE test was provided by E. Bell, K. Jurek, and T. Wilson of the occupational therapy department at Warm Springs Rehabilitation Hospital, Gonzales, Texas. Appreciation is extended to all the people who participated as subjects or contacts.

INTRODUCTION

Objective measurements of performance are vital to justify the need for therapeutic services and to conduct studies that measure the effectiveness of treatment procedures (Bell, et al 1976). Evaluation of treatment procedures may be especially pertinent for individuals whose upper extremities are affected by arthritis.

Arthritis can affect a person of any age, has a variety of causes and effects, and can be of short duration or a lifelong condition. Functional problems caused by arthritis arise from limitations in active and passive movement. With both osteo- and rheumatoid arthritis, treatment methods are basically the same: relief of pain, protection of the affected joints, and therapeutic exercise geared toward maintaining maximum independent functions (Spencer, 1978).

The fine motor manipulations involved with the performance of many horticultural activities can be used therapeutically for physical rehabilitation of the hand.

This study investigates elderly persons' performance from two groups (one whose upper extremities are affected by arthritis and one without arthritis) using two methods of objectively evaluating hand skill (one involving horticultural tasks and one involving established occupational therapy tasks).

REVIEW OF RELATED LITERATURE

Brown, et al (1960) and Long, et al (1961) completed a comprehensive study of the hand musculature using indwelling wire electrodes and showed that the interrossei of the hand act best and strongest when a combination of flexion and extension were performed.

Schencker (1966) reported that accurate joint motion measurement had persistently defied repeated attempts toward satisfactory execution. Schencker developed an accurate method of finger joint measurement. The technique was based on the geometrical determination of the angle of finger movement (range of motion). No anatomical landmarks were involved nor was any instrumentation used.

Rehabilitation of the hand has not only become a specialty area in its own right, but has been touched upon in all aspects of occupational therapy. Patients with physical disabilities of their upper extremities have been treated through the use of manual tasks (Hollis, 1978).

Since the passage of the Rehabilitation Act of 1973, the evolution of holistic rehabilitation has increased the opportunities available to the disabled population. Many adjunctive therapies have developed which use art and recreation as well as horticulture to assist the individual with reintegration into the mainstream of society (Rothert and Daubert, 1981).

According to Rothert and Daubert, clients who require physical therapy often are unmotivated and demoralized, particularly in a

long-term program where repetition and boredom become factors. The horticultural environment can be a valuable motivator. The horticultural therapist can apply the progress made to real situations with practical demonstrations to the client. Most muscle areas of the body are involved in horticultural activity and there is the added dimension of a pleasant and stimulating work environment.

Rothert and Daubert conclude that there are different types and degrees of disability associated with arthritic extremities. Limiting factors are decreased motion, strength and coordination, accompanied with pain. The goals of treatment are to increase upper extremity joint motion, strength, and coordination. Gardening activities that facilitate these goals include vegetable, flower and herb gardening, nature walks, watering and nature crafts.

The occupational therapist is frequently requested to make an objective judgement of the hand skill of a patient, based on subjective observations. Subjective statements appear indecisive and insignificant when reported to other health-care personnel, although the observations may be correct. Subjective observations cannot be used in research studies to measure the effectiveness of treatment techniques. For these reasons, the occupational therapy department at the Texas Rehabilitation Hospital developed an objective standardized test of hand skill, the PCE, the Physical Capacities Evaluation of Hand Skill (Bell, et al 1976).

METHODS

Subjects

Thirty-six elderly persons were randomly selected as subjects from two nursing homes, one senior citizen residence center, and three private homes in the Manhattan, Kansas area. A majority (90%) of the subjects were female; ages of all subjects ranged from 52 to 97 years. Eighteen of the elderly were classified as having osteo- and/or rheumatoid arthritis and eighteen as not having arthritis.

Procedures

Before administering the test, the Subject Orientation Statement was read to the subjects and they were asked to sign the Advised Consent Form (see appendix A) by the test administrator. The Advised Consent Form was read and explained to subjects if necessary. After the subject signed the Advised Consent Form, the test administrator demonstrated and explained the first task to be performed. The test involved seven steps, (six tasks and certain anthropometric measurements), which were arranged numerically. To reduce order effect bias, a method of randomization of task performance was employed. Each person began the test on the step that consecutively followed the step on which the previous subject had begun, and completed the tasks in succession. The time required to complete the test was 20-30 minutes per subject.

Instrumentation

The HCHT is a diagnostic procedure for objective evaluation of hand skill during performance on horticultural tasks. Three non-horticultural tasks were selected for comparison with the HCHT tasks

from the Physical Capacities Evaluation of Hand Skill (PCE) test battery (see appendix B and Plates 1-3). The PCE test was developed, and has been effectively used, by occupational therapists at the Texas Rehabilitation Hospital as a gauge of hand performance relative to providing therapeutic service (Bell, et al 1976).

The PCE test consists of seven separate tasks. Three of the tasks were selected for use in this study, as the hand movements involved during their performance are comprehensive of all movements in the PCE test. These movements measure gross cylindrical or extrinsic grasp and release, tripod or jawchuck prehension, fingertip pinch and manipulation, and fingernail pinch. The tasks are timed until completion or for a specified period because one of the components of skill is speed (Bell, et al 1976).

PCE Tasks

1) Pincount (Plate 1)
2) Coincount (Plate 2)
3) Pegboard (Plate 3)

The Hand Capacities Horticultural Test (HCHT) tasks, as selected at face validity, involve similar manipulations to perform as the PCE tasks.

HCHT Tasks

1) Peapick (Plate 1)
2) Seedcount (Plate 2)
3) Seedsow (Plate 3)

For group performance comparison, hand strength and anthropometric

measurements were taken of the subjects preferred hands. These measures were grasp, lateral prehension, hand length, breadth and spread, and are presented in Table I. A hand dynamometer (Lafayette Instrument Co. Model 78010) was used to measure grip strength and lateral prehension. Anthropometric measurements were recorded to the nearest millimeter.

Data Analysis

Analysis of data was accomplished using the ANOVA program of the Statistical Analysis System (SAS Institute Inc., 1982). Group mean scores were compared using the Duncans Multiple Range Test for all variables. Pearson correlation coefficients were calculated for the PCE variables and HCHT variables. A forward stepwise regression analysis was done predicting HCHT task performance from the PCE task performance, strength measurements and anthropometric data.

RESULTS AND DISCUSSION

Demographics

The 36 subjects involved with this study are representative of elderly populations in the U.S. The nonarthritic classification consisted of 15 people without a disabling condition, as well as, 3 people with physically disabling conditions other than arthritis, (1 had tendonitis, 1 had suffered a stroke to the right side, and 1 was legally blind in the right eye). The arthritic classification consisted of 18 persons with a form of arthritis that affected their hand or arm functioning to some degree, even if it was in remission (7 had rheumatoid arthritis, 7 had osteo-arthritis, and 4 were affected by both rheumatoid and osteo-arthritis). The mean age of the groups were statistically similar (arthritic = 81, non-arthritic = 76). The ratio of females to males was five to one.

Strength Measurements and Anthropometric Characteristics

The physical dimensions and strength characteristics of the subjects' preferred hands are presented in Table I. There were no significant differences in the hand size and strength measurements of the elderly persons who had arthritis and those that did not have arthritis. Although nonsignificant, grasp and lateral prehension of the nonarthritic subjects was about one and one-half times that of the arthritic subjects. The decreased grasp and lateral prehension of the arthritic persons could be an indication of the physically limiting effects of arthritis on hand strength and dexterity involved with task performance.

Arthritic vs. Nonarthritic Performance

The mean scores for the two groups' performance on the HCHT and PCE tasks are presented in Table II. Although nonsignificant, the nonarthritic subjects performed slightly better on all tasks. The scores were significantly different on the Seedsow and Pegboard tasks. The nonarthritics performed the similar series of movements required of the two tasks, (planting seeds in a flat and placement of pegs in a pegboard), at a faster rate than the arthritics. The Seedsow and Pegboard tasks were the only tasks that required a series of movements. The lower scores of the arthritics could be a disabling characteristic of arthritis when engaging in a sequence of movements.

Correlating PCE Tasks With HCHT Tasks

As shown in Table III, highly significant correlations exist between the PCE and HCHT tasks that require similar hand manipulations to perform, i.e. Coincount and Seedcount, Pincount and Peapick, Pegboard and Seedsow. The significant negative correlations are derived from comparing scores that are based on the number of seconds taken for task completion (high values) to scores based on the number of steps of a task completed in thirty seconds (low values). The positive correlations result from similar value score comparison. Values obtained comparing

right-handed task performance were higher than for left-handed performance for both groups, (6 of 9 correlations for the arthritic group and 5 of 9 for the nonarthritic group). This indicates that there is more consistency in performing various tasks with the right-hand, regardless of being affected by arthritis.

Predicting HCHT Task Performance From PCE Scores and Anthropometric Data

A forward stepwise regression analysis for predicting the horticultural task scores from the anthropometric measurements and the PCE task scores is shown in Table IV. Scores obtained for the PCE variables that appear in the equations can be used to indicate performance on the corresponding HCHT task. The Pegboard and Coincount tasks were the most commonly observed variables appearing in 8 of the 12 equations. Performance on the Pegboard and Coincount tasks of the PCE test were the most consistent predictors of HCHT task performance. This indicates that the hand and finger manuevers and manipulations required in placing pegs on a pegboard and in removing coins from a coin purse resemble the movements required in the horticultural tasks. Of the anthropometric measures taken, hand spread was in 3 of the 4 equations predicting Seedcount. This indicates that the ability to spread the fingers apart corresponds to the ability to remove seeds from a container.

Left vs. Right-Handed Performance

Of all the subjects tested, only 2 were left-handed, (one arthritic and one nonarthritic). The arthritics' scores on all tasks with their left hands relative to the scores with their right

hands were higher than the nonarthritics. This could be an indication of the adaptability of the arthritic to the physical limitations imposed by arthritis on the functional use of their dominant right hands. When arthritis impairs use of the dominant hand, it becomes convenient if not necessary to use the nondominant hand more often, whereas the nonarthritics tend to rely upon their dominant right hands for performing daily functions and have less experience with use of their left hands than the arthritics.

In predicting individual horticultural task scores with the left and right hands, there were 6 similar PCE variables for the arthritics and 3 similar variables for the nonarthritics. The increased uniformity of variables in predicting task performance of the right and left hands among the arthritic subjects could be an indication of the ambidexterity that they have developed.

Application to H.T. Professional Use

The HCHT allows for an objective assessment of hand skill that would: 1) Provide an effective method of justifying the need for and the benefit of therapeutic services; 2) Enable the H.T. to choose activities that are suited to meeting individual clients' needs, specifically related to rehabilitation of the hand; 3) Serve as a baseline for quantitatively measuring clients' ability to perform simple horticultural tasks.

Conclusions and Recommendations

The results of this study show that there is a resemblance in the fine motor skills involved during the performance of simple horticultural tasks and those involved during the performance of tasks

used in occupational therapy settings that are proven as effective evaluators of hand skill for rehabilitative purposes. Further research is needed in the area of gross motor functions involved during gardening activities. This research could lead to maximizing the potentials that are inherent of horticultural activities.

Table I HAND STRENGTH AND ANTHROPOMETRIC CHARACTERISTICS OF THE SUBJECTS' (n=36) PREFERRED HANDS[1]

		MEAN	S.D.
GRASP (Kg)	ARTHRITIC	16.3 a[2]	10.5
	NONARTHRITIC	22.7 a	8.9
LATERAL PREHENSION (Kg)	ARTHRITIC	4.2 a	2.5
	NONARTHRITIC	5.5 a	3.0
LENGTH (mm)	ARTHRITIC	18.1 a	1.1
	NONARTHRITIC	18.4 a	0.8
BREADTH (mm)	ARTHRITIC	9.9 a	1.7
	NONARTHRITIC	9.9 a	1.0
SPREAD (mm)	ARTHRITIC	18.5 a	2.8
	NONARTHRITIC	19.7 a	1.7

[1]Format adapted from Rohles (1983)
[2]Means followed by the same letter do not differ significantly at .05 level

Table II

COMPARISON OF HAND CAPACITIES HORTICULTURAL TEST (HCHT) & PHYSICAL CAPACITIES EVALUATION OF HAND SKILL (PCE) MEAN SCORES

Test	Task	Condition	Left Hand	Right Hand
HCHT	1) Seedcount (# of seconds for removal of 11 seeds)	Arthritic	29.1 a	31.1 a
		Nonarthritic	21.9 a	21.9 a
	2) Peapick (# of peas in 30 seconds)	Arthritic	20.9 a	21.6 a
		Nonarthritic	23.9 a	25.1 a
	3) Seedsow (# movements in 30 seconds)	Arthritic	11.7 a	10.6 b
		Nonarthritic	14.8 a	14.6 a
PCE	1) Coincount (# of seconds for removal of 11 coins)	Arthritic	33.8 a	32.7 a
		Nonarthritic	28.2 a	27.2 a
	2) Pincount (# of pins in 30 seconds)	Arthritic	12.8 a	13.0 a
		Nonarthritic	16.5 a	18.1 a
	3) Pegboard (# of movements in 30 seconds)	Arthritic	8.1 a	7.9 b
		Nonarthritic	9.8 a	10.9 a

Means followed by the same letter do not differ significantly at .05 level.

Table III

PHYSICAL CAPACITIES EVALUATION OF HAND SKILL (PCE) & HAND CAPACITIES HORTICULTURAL TEST (HCHT) CORRELATIONS

PCE Tasks	HCHT TASKS					
	1) Seedcount		2) Peapick		3) Seedsow	
A) Coincount	Arthritic	Nonarthritic	Arthritic	Nonarthritic	Arthritic	Nonarthritic
Right Hand	.943*	.884*	-.815*	-.571*	-.560*	-.718*
Left Hand	.855*	.718*	-.767*	-.762*	-.622*	-.692*
B) Pincount						
Right Hand	-.724*	-.732*	.817	.735*	.576*	.876*
Left Hand	-.713*	-.839*	.714*	.728*	.568*	.763*
C) Pegboard						
Right Hand	-.728*	-.627*	.799*	.749*	.826*	.874*
Left Hand	-.830*	-.736*	.840*	.795*	.763*	.807*

*$p < .05$

Table IV

REGRESSION EQUATIONS FOR PREDICTING THE HCHT TASK SOURCES (T)
FROM THE PCE TASK SCORES AND ANTHROPOMETRIC DATA

HCHT Task	Hand	R^2
A) Seedcount		
Arthritic	(T)Right = -12.29 + 1.36(SPRD) - 1.19)PegRt) + 1.2(CoinRt) - .35(Coinlft)	.94
	(T)Left = 46.72 + 1.18(SPRD) - 1.62(PegRt) + .41(CoinRt) - 2.20(LNTH)	.90
Nonarthritic	(T)Right = 3.68 + .65(CoinRt)	.92
	(T)Left = 19.12 + 1.09(SPRD) - 1.04(PinRt)	.88
B) Peapick		
Arthritic	(T)Right = 21.02 + .59(SPRD) - .19(CoinRt) + .34(PinLft)	.81
	(T)Left = 16.36 + 1.18(PegRt) - .14(CoinLft)	.78
Nonarthritic	(T)Right = 10.07 + 1.37(PegRt)	.56
	(T)Left = 15.21 + .56(PegRt) + .61(PegLft) - .12(CoinLft)	.80
C) Seedsow		
Arthritic	(T)Right = -1.26 + 1.30(PegRt) + 1.16(PegLft)- .60(PinLft)	.90
	(T)Left = 1.81 + 1.73(PegRt) + 1.11(PegLft)- .70(PinLft)	.89
Nonarthritic	(T)Right = 6.05 + .54(PegLft)-.08(CoinLft)+1.08(PinRt) - .45(PinLft)	.93
	(T)Left = 21.85 - .97(SPRD) -.07(CoinRt) + .77(PinRt)	.92

PCE Task

PegRt = # pieces in 30 seconds w/right hand
PegLft = # pieces in 30 seconds w/left hand
PinRt = # pins/30 seconds w/right hand
PinLft = # pins/30 seconds w/left hand
CoinRt = # seconds for removal of 11 coins w/right hand
CoinLft = # seoncs for removal of 11 coints w/left hand

Anthropometric Data

SPRD = hand spread (mm)
LNTH = hand length (mm)
LPR = lateral prehension (kg)

Plate 1

PCE TASK

Pincount Test

Materials: Box of straight pins.

Directions: Examiner spreads pins out on table. Subject picks pins up, one at a time and replaces them in pin box.

Time: Thirty seconds.

Score: Number of pins picked up.

HCHT TASK

Peapick Test

Materials: Small container of pea seeds.

Directions: Examiner spreads seeds out on table. Subject picks up seeds one at a time and places them into container.

Time: Thirty seconds.

Score: Number of seeds picked up.

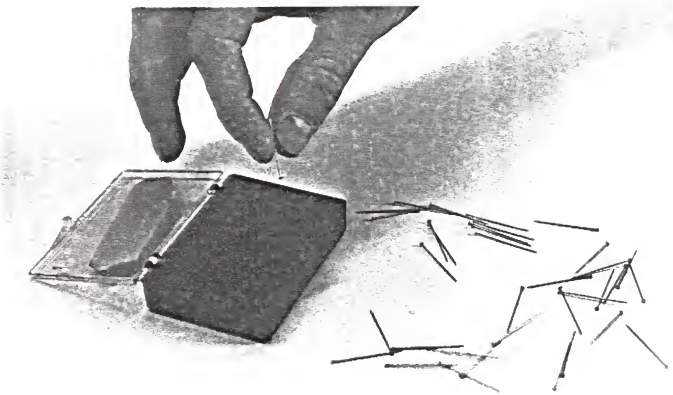


Plate 2

PCE TASK

Coincount Test

Materials: One small snap-top coin purse; five pennies, three quarters, one dime, two nickels.

Directions: Remove all coins from purse one at a time.

Time: Length of time from opening of purse to closing of purse.

Score: Number of seconds.

HCHT TASK

Seedcount Test

Materials: Small container with lid; five lima bean seeds, three squash seeds, two pole bean seeds, and one pea seed.

Directions: Remove all seeds from container one at a time.

Time: Length of time from opening until closing container.

Score: Number of seconds.

Plate 3

PCE TASK

Pegboard Test

Materials: .3048 meter (12 inches) x .3310 meter (15 inches) test board. 25 pairs of holes lined up in center of 12 inch side. Four troughs, 1/2 inch deep with tapered sides; Pegs: 25, 1 inch x 1/8 inch; Washers: 25, hole is 3/16 inch; Sleeves: 25, inside diameter is 3/16 and is 5/8 inches tall.

Directions: Unilateral: Peg is placed in closest right-hand hole with right hand (left-hand hole with left hand), then a washer is placed on the peg with the same hand, then sleeve with the right hand.

Time: Unilateral: Thirty seconds, timed twice.

Score: Unilateral: Number of individual pieces assembled in thirty seconds.

HCHT TASK

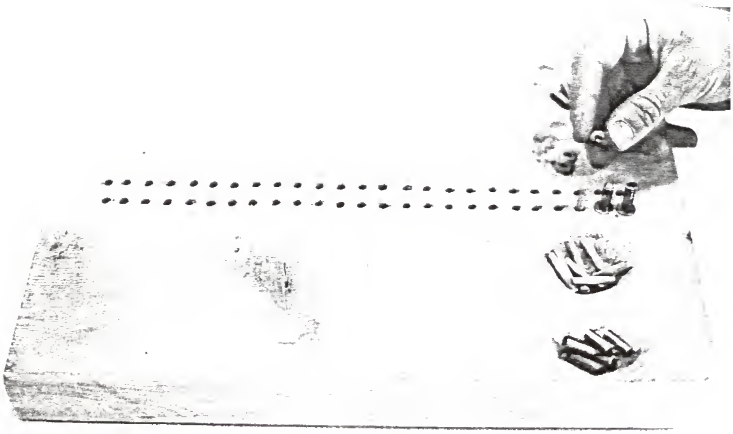
Seedsow Test

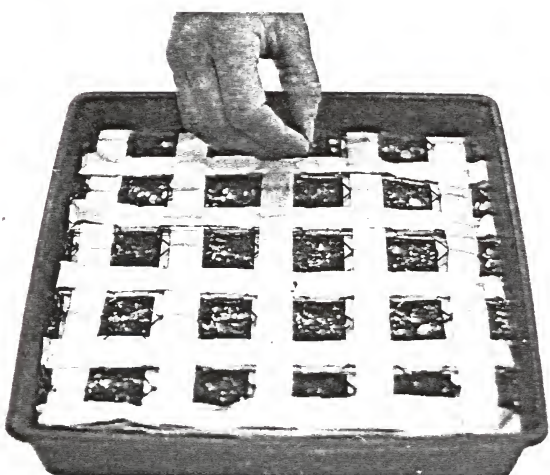
Materials: One 27.5 x 55 cm. flat filled with soil; one 22 x 10 inch wire mesh that fits inside of flat on top of soil; ample supply of three different sized seeds and small amount of perlite.

Directions: Unilateral: Subjects use fingers of right hand to poke hole in center of squares outlined by wire mesh on the right half of flat, (left-hand side with finger of left hand), pick out a seed, place in hole, gather some perlite and cover seed.

Time: Unilateral: Thirty seconds, timed twice.

Score: Number of steps completed.





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APPENDIX A

SUBJECT ORIENTATION STATEMENT

INFORMED CONSENT STATEMENT

MEASURING HAND SKILL PERFORMANCE DURING HORTICULTURAL ACTIVITIES

SUBJECT ORIENTATION STATEMENT

This study is being conducted under guidelines established by Kansas State University. This study will investigate the hand skills of people who have arthritis. Your participation will provide answers to important questions concerning use of horticultural therapy activities. Participation in this study is voluntary and you may withdraw at any time, for any reason. You will be asked to perform eight tasks that will require concentration for short intervals which may cause mild fatigue. The overall length of time needed to complete the tasks will be about 30 to 40 minutes.

During the study, you will be required to do the following: 1) Place pegs into a peg board, 2) Count coins in a coin purse, 3) Pick up and place straight pins in a pin box, 4) Squeeze a hand-grip device and measure your hand dimensions, 5) Pick up and place seeds in a container, 6) Remove seeds from a container one at a time, 7) Plant seeds in a container filled with soil, and 8) Fill pots with soil using a hand trowel, then place the pots in a tray.

Each task will be demonstrated and explained before you try it. You will not be at physical risk. Some of the tasks will be timed. Information collected will be kept strictly anonymous. Names will not be associated with any public or private report of the results. Do you have any questions?

MEASURING HAND SKILL PERFORMANCE DURING HORTICULTURAL ACTIVITIES

INFORMED CONSENT STATEMENT

1. I,_____ volunteer to participate in a project in connection with research studies to be conducted by Kansas State University.

2. I fully understand the purpose of the study as outlined in the orientation statement.

3. I also understand that my performance as an individual will be treated as research data and will in no way be associated with me for other than identification purposes, thereby assuring anonymity of my performance and response.

4. I understand that I am a volunteer for this research, and that I may decline to participate with no penalty or loss of benefits to which I am otherwise entitled. I further understand that I will be permitted to leave the test at any time and I may discontinue participation without penalty or loss of benefits to which I am otherwise entitled.

5. I hereby agree not to give information regarding these studies to any public news media nor to publicize any articles or other accounts thereof without prior written approval of Kansas State University.

6. If I have any additional questions or concerns about this study, I understand that I can contact Mark Gallagher at 532-5944 or Dr. Richard Mattson at 532-6170.

7. I have read the Subject Orientation Statement, this_____ day of _____, 1983.

_____
Signature

Sign and return one copy. The second copy is for your records.

APPENDIX B

THE PHYSICAL CAPACITIES EVALUATION OF HAND SKILL (PCE)

The Physical Capacities Evaluation of Hand Skill Test

This test is a measurement of hand skill performance that was developed by Esther Bell, M.A., O.T.R., Kathleen Jurek, O.T.R., and Thelma Wilson, O.T.R. at the Warm Springs Rehabilitation Hospital, Gonzales, TX, as a gauge for treatment of physically disabled persons. A follow-up study of thirty hemiplegic subjects using the conditional probability theorem, showed a .98 probability of using the PCE battery of tests as a predictor of success in learning the activities of daily living. PCE performance has been useful in directing the emphasis of occupational therapy treatment toward specific hand skill development.

The PCE test battery is composed of five unilateral and seven bilateral hand skill tests which measure gross cylindrical or extrinsic grasp and release, intrinsic grasp and release, tripod or jawchuck prehension, finger-tip pinch and manipulation, and fingernail pinch.

Three PCE tests were used in this study: 1) Pincount Test; 2) Coincount Test; 3) Pegboard Test.

MEASURING ARTHRITIC HAND SKILL PERFORMANCE DURING HORTICULTURAL ACTIVITIES

by

MARK J. GALLAGHER

B.S. - University of Minnesota, 1982

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Horticulture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1984

This study investigated elderly persons' (age range: 52-97 years) performance from two groups (one whose upper extremities are affected by arthritis and one without arthritis), using two methods of objectively evaluating hand skill (one involving horticultural tasks and one involving established occupational therapy tasks).

The Hand Capacities Horticultural Test (HCHT) was developed to objectively evaluate hand skill performance on horticultural tasks. Nonhorticultural tasks of the Physical Capacities Evaluation of Hand Skill (PCE) test battery developed for occupational therapists were also evaluated and compared with the HCHT. The tasks selected from the PCE were picking up pins (Pincount), counting coins (Coincount), and placing pegs in a board (Pegboard). The HCHT tasks required similar hand coordination to perform as the selected PCE tasks. The HCHT tasks were picking up peas (Peapick), counting seeds (Seedcount), and planting seeds (Seedsow).

Significant correlation values occured between "Pincount" and "Peapick"; "Coincount" and "Seedcount"; and "Pegboard" and "Seedsow" tasks.

A stepwise regression analysis was done for predicting performance on the HCHT tasks from PCE task scores, the anthropometric characteristics and strength measurements of the preferred hands. Prediction equations for the arthritic subjects' HCHT scores were more varied than for those of the nonarthritics. Nonarthritic subjects performed more consistently on the PCE and the HCHT tasks than did arthritic subjects. For example, in the prediction equation for Seedcount, 8 variables contributed to left/right hand performance of arthritic subjects, only 3 variables contributed to left/right hand performance of nonarthritic subjects.

Correlation and stepwise regression analyses suggest that horticultural activities can be effectively used for diagnosing disability and prescribing treatment in physical rehabilitation programs.